

680

STS-51F

SOUP SOLAR WHITE-LIGHT IMAGES
85-063A-08A

SOURCE CODE TO READ SOUP DATA
85-063A-08B

REQ. AGENT
JPB

ACQ. AGENT
DAB

STS-51F

SOUP SOLAR WHITE-LIGHT IMAGES

85-063A-08A

This data set catalog contains 5 Soup White-Light Images data tapes. The tapes are 9 track, multi-filed, 6250 BPI and written in the VAX/VMS COPY format.

<u>D#</u>	<u>C#</u>	<u># of Files</u>
D-79173	C-27520	1266
D-79174	C-27521	1392
D-79175	C-27522	942
D-79176	C-27523	996
D-79177	C-27524	249

REQ. AGENT
JPB

ACQ. AGENT
DAB

STS-51F

SOURCE CODE TO READ SOUP DATA

85-063A-08B

This data set catalogue contains 1 tape of source codes for reading the data files in data set 85-063A-08A. The tape is 9 track, 6250 BPI, ASCII and written in the VAX/VMS COPY format. The tape contains 5 sets of source code: RCCREAD.FOR, RCCREAD.OBJ, RCCREAD_512.FOR, RCCREAD_512.OBJ AND FORD.IDL.

D-79178

C-27525

SOUP WHITE LIGHT DIGITAL MOVIES

K. Topka, O/9130, B/256 Last rev. 4-20-87

Files	Subject	Start (D217/1985)	Stop (D217/1985)	Repeat	Frames	Rev	Scale (arcsec /pixel)
D-79174 C-27521	C00002-167.RCC	Pores	19:10:35	19:38:05	10s	166	110 0.23
D-79175 C-27522	C00400-565.RCC	Sunspot	19:10:35	19:38:05	10s	166	110 0.21
D-79173 C-27520	C18N022-139.RCC (1)	Sunspot	19:24:01	19:28:01	2s	118	110 0.15
D-79173 C-27520	C20N001-166.RCC (2)	Quiet Sun	19:10:35	19:38:05	10s	166	110 0.16
D-79173 C-27520	C23N004-084.RCC (3)	Upwelling	19:22:45	19:25:25	2s	81	110 0.16
D-79173 C-27520	C25N001-008.RCC	Sunspot	16:33:18	16:41:56	64s	8	108 0.15
D-79173 C-27520	C25N009-029.RCC	Sunspot	17:47:27	18:13:26	1rr	21	109 0.15
D-79173 C-27520	C25N030-035.RCC	Sunspot	21:01:59	21:08:08	64s	6	111 0.15
D-79174 C-27521	C26N001-054.RCC	Limb	14:59:51	15:11:33	13s	54	107 ?
D-79174 C-27521	C27N001-010.RCC	Limb (low res)	15:04:16	15:06:16	13s	10	107 ?
D-79174 C-27521	C28N001-056.RCC (4)	Quiet Sun (low res)	19:10:35	19:38:05	30s	56	110 ?
D-79174 C-27521	C29N001-178.RCC (5)	AR 4682	19:10:35	19:40:56	10s	168	110 0.27
D-79175 C-27522	C32N001-010.RCC	Sunspot	19:10:35	19:38:05	4s	10	110 ?
D-79175 C-27522	C33N001-138.MRC	Quiet Sun	19:10:35	19:38:05	4s	138	110 ?
D-79176 C-27523	C47AQ001-083.RCC	Quiet Sun	19:10:35	19:38:05	20s	83	110 ?
D-79176 C-27523	C47BQ001-083.RCC	Pores	19:10:35	19:38:05	20s	83	110 ?
D-79177 C-27524	C47Q001-083.RCC	Full field	19:10:35	19:38:05	20s	83	110 ?
D-79176 C-27523	C51N001-166.RCC	Sunspot	19:10:35	19:38:05	10s	166	110 ?

- (1) First frame (19:24:01) (19:24:03) repeated 10 times (C18N000-009.RCC).
second frame (19:24:03) repeated 13 times (C18N010-C18N021.RCC,
C19N023.RCC). C18N022.RCC is a copy of C18N001.RCC.
- (2) Movies 20 and 23 are the same scale and region with a 66 pixel shift
in Y.
- (3) First 3 frames are the sunspot at same magnification (time 19:22:45).
Next 81 frames are of the upwelling.
- (4) This sequence has a large field of view that has vignetting.
- (5) Last 10 frames are a jitter test. Two frames (19:40:46,19:40:56)
were added.

Rev number refers to the Spacelab orbit number.

Lockheed Palo Alto Research Laboratories

Zoe A. Frank
Solar Physics, Dept. 91-30, B256
3251 Hanover Street
Palo Alto, CA 94304
(415) 424-4009

August 11, 1988

Dr. Sang Kim
Code 633
GSFC/NASA
Greenbelt, MD 20771

Dear Dr. Kim:

Here are the SOUP (Solar Optical Universal Polarimeter) data files and documentation that were promised per our telephone conversation on August 10. The package contains the following information:

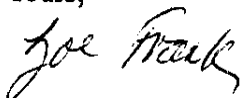
Five tapes of processed data files (6250 BPI, VAX/VMS COPY format) - 85-03A-08A
One tape of source codes for reading the data files B
One 16mm movie of a segment of Spacelab II data C
(as an example of the raw data taken on board).

We have also sent the documentation listed below.

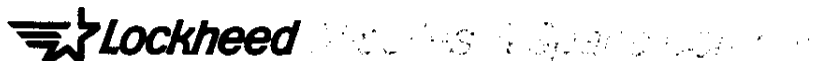
Reading the processed data files
List of processed file included
List of available white light film data
Report on SOUP inflight anomalies
Data Flow diagram
SOUP instrument diagram
Spacelab II Fine Guider information
Spacelab II IPS (Instrument Pointing System) information
Information describing jitter in the IPS and SOUP Fine Guider compensation
SOUP (Spacelab II, Experiment #8) instrument characteristics
SOUP experiment description
Copy of the Preliminary Science Report
List of published papers regarding SOUP data
Copies of selected science papers

Please note that this is a preliminary data shipment. There is additional information and documentation which is to be sent in September. Please contact me if any problems are encountered.

Yours,



Zoe A. Frank



Research and Development
3251 Hanover Street, Palo Alto, California 94304-1191

In reply refer to:
IMSC/F275736

11 August 1988

Procurement Office
National Aeronautics and Space Administration
George C. Marshall Space Flight Center
Marshall Space Flight Center, AL 35812

Attention: Tim Crabb, Code AP32G
Contracts Office

Subject: Contract NAS8-32805

Reference: (a) Contract Article 3.9 Final Report/
Scientific Data Analysis

(b) Telecon W. Jaynes/IMSC and T. Crabb/NASA
12 August 1988

Enclosure: (a) Letter Z. A. Frank/IMSC to Dr. S. Kim/NASA dated
11 August 1988

1. Pursuant to the reference (a) contract requirement, the contractor has forwarded data files and documentation to the National Space Science Data Center (NSSDC) at Goddard Space Flight Center. Enclosure (1) is a list of this material.

2. If there are any questions regarding this submittal please contact Paul Bull at (415) 424-2007 or Zoe A. Frank at (415) 424-4009.

LOCKHEED MISSILES & SPACE COMPANY, INC.
Research & Development Division

P. R. Bull
Contract Administration

PRB:bw

cc: National Aeronautics and Space Administration
National Space Science Data Center
Goddard Space Flight Center
Greenbelt, MD 20771

ATTN: Dr. Sang Kim, Code 633

w/encl: (1) Letter Z. A. Frank/IMSC to Dr. S. Kim/NASA
8/11/88

(2) Experiment Data, Data files and Documentation

11/88 -1

85-063A-08A

85-063A-08B

The Solar Optical Universal Polarimeter experiment was flown in July of 1985 on board the Spacelab II shuttle mission. The SOUP registered files (*.RCC files), which are found on these tapes, are 256x256 integer, direct access files containing image data. The only exception to this is the C47Q***.RCC sequence which consists of a 512x512 integer array. Since white light photographic data was the highest quality original data acquired by SOUP, the registered files were created by the following process.

First, the film data was digitized into a 512x512 image array using a CCD camera system. Images were registered, or corrected to remove the effects of solar rotation. Dust and irregularities in the optics were corrected for by dividing out flat field images digitized with no film in the light path. Corrections were also made for bad pixels and irregularities in the CCD by subtracting dark current images of the CCD (i.e., with no light passing through the system). Finally, the 512x512 array was compressed into 256x256 format by averaging groups of four pixels. The C47Q***.RCC sequence is a mosaic of four 256x256 images covering the full SOUP field of view. This process is shown in the data flow diagram which is included in this package. Header information is loaded into the first 512 bytes of each data file. We refer to these files as "F0" files.

The following code is a simple FORTRAN subroutine which, given a file name specification, will load the data from disk into a 256x256 integer array.

```

      SUBROUTINE RCCREAD (FNAM,HEAD,ARR)
      C TO READ REGISTERED CCD DIGITIZED FILES
      C FNAM IS CHARACTER STRING CONTAINING FILENAME (PASSED)
      C HEAD IS A 512 BYTE ARRAY CONTAINING HEADER INFORMATION
      C ARR IS THE 256x256 INTEGER*2 IMAGE ARRAY (RETURNED)
      BYTE HEAD(512)
      INTEGER*2 ARREC(256),ARR(256,256)
      CHARACTER*(*) FNAM
      OPEN(UNIT=1,NAME=FNAM,STATUS='OLD',ACCESS='DIRECT',
1 RECL=128,ERR=999,READONLY)
      READ(1,REC=1,ERR=998) HEAD
      DO I=1,256
        READ(1,REC=I+1,ERR=998) ARREC
        DO J=1,256
          ARR(J,I)=ARREC(J)
        ENDDO
      ENDDO
      GO TO 997
999  TYPE *, 'OPEN ERROR'
      GO TO 997
998  TYPE *, 'READ ERROR'
997  CLOSE(UNIT=1)
      RETURN
      END

```

Note: The 512x512 integer arrays in the files called C47Q*.RCC may be read in as follows:

```

      SUBROUTINE RCCREAD (FNAM,HEAD,ARR)
C   TO READ REGISTERED CCD DIGITIZED FILES
C   FNAM IS CHARACTER STRING CONTAINING FILENAME (PASSED)
C   HEAD IS A 512 BYTE ARRAY CONTAINING HEADER INFORMATION
C   ARR IS THE 512x512 INTEGER*2 IMAGE ARRAY (RETURNED)
      BYTE HEAD(512)
      INTEGER*2 ARREC(256),ARR(512,512)
      CHARACTER*(*) FNAM
      OPEN(UNIT=1,NAME=FNAM,STATUS='OLD',ACCESS='DIRECT',
1 RECL=128,ERR=999,READONLY)
      READ(1,REC=1,ERR=998) HEAD
      DO I=1,512
        K=I*2
        READ(1,REC=K,ERR=998) ARREC
        DO J=1,256
          ARR(J,I)=ARREC(J)
        ENDDO
        READ(1,REC=K+1,ERR=998) ARREC
        DO J=1,256
          ARR(J+256,I)=ARREC(J)
        ENDDO
      ENDDO
      GO TO 997
999  TYPE *, 'OPEN ERROR'
      GO TO 997
998  TYPE *, 'READ ERROR'
997  CLOSE(UNIT=1)
      RETURN
      END

```

The source codes for these routines are included on magnetic tape along with the IDL procedure FORD.IDL which may be used to read the SOUP data files.

Z. Frank, O/9130, B256, Last rev. 7/18/88

New Standard (F0) Files

Files with the new format are a kind of general data array. A file can contain different types of data (byte, word, longword, F_floating or D_floating) and can have up to 16 dimensions (although images have only two). Each file also has a header containing the type and size information, as well some text.

The format itself:

The files are direct access files with 512 byte records (compatible with the "old standard"). The first record is a 512 byte header containing the following fields:

Byte(s)	Values
0-3	Sync longword (\$AAAA5555)
4	Format code (future expansion) def=0
5	Source (future expansion) def=0
6	Number of header blocks (min of 1)
7	Data type (1 =I*2, 2 =I*4, 3 =R*4)
8	Number of dimensions (max of 16)
9-191	Unused (free for other parameters)
192-255	Size of each dimension (longwords)
256-511	Header text. Lines separated by CR (13). First null in text is end of text.

After header block(s) (there can be more than one), data comes packed sequentially, with the first index varying most rapidly (as in Fortran). I like to call this particular format definition "F0" (note that this is "F zero"), so we could call such files "F0 files". Seems better than referring to them as "new standard" all the time.

F0 files can be read into IDL using the function F0, defined in FORD.IDL. It is used as follows: Do

```
IDL>.RUN FORD.IDL
```

once to compile the function, then do

```
IDL>X = F0(name)
```

or

```
IDL>X = F0(name,header)
```

to read the data from the file "name" into IDL variable X. If header is specified, it will return with the data from the file header. Header will be a BYTE array, NOT a string, so may be difficult to deal with. Whenever F0 reads a file, it will type the header text on the terminal.

S. Ferguson, O/9130, B256

SOUP White Light Film from Spacelab-2

Summary of Available Data

Ken Topka
Dept 91-30/B255
File: ORION::DSK1:[TOPKA.SOUP]SOUPWLF.TEX
Dec 12, 1985

This is a summary of the available white light film from SOUP. It is based on notes and log sheets written and compiled by Ted Tarbell, and by a visual inspection of a complete fine-grain positive copy of the original flight film by Ken Topka.

REV 100:

SOUP originally acquired the sun on an undefined quiet region. About 11 minutes later AR 4682 was acquired and the pointing remained there for the rest of this orbit. The IPS was probably moving around the sun for much if not all of this first 11 minutes. The exposure factor was changed from 6 to 8 just after 04:25:18 UT, and remained there until the end. The WL film camera was left on after the IPS lost optical hold of the sun at 04:36:44, which is very close to sunset.

Target on sun: Quiet Sun (on disk)
WL camera on time: 217/04:01:22
WL camera off time: 217/04:12:10
Elapsed time (sec): 648
Repetition time: 2 sec
Total number of frames: 325
Exposure factor: 6
Limb guider status: Off
Comments: Crew was probably searching for AR 4682 during much of this time so pointing is not stable.

Target on sun: AR 4682
WL camera on time: 217/04:12:12
WL camera off time: 217/04:25:18
Elapsed time (sec): 786
Repetition time: 2 sec
Total number of frames: 394
Exposure factor: 6
Limb guider status: Off
Comments: Exposure factor changed to 8 just after 04:25:18

Target on sun: AR 4682
WL camera on time: 217/04:25:20
WL camera off time: 217/04:38:08
Elapsed time (sec): 768
Repetition time: 2 sec
Total number of frames: 385
Exposure factor: 8
Limb guider status: Off
Comments: The IPS loses optical hold and moves off the sun
around 04:36:44, which is very close to sunset.
The frame at that time is blurry and the spots
have moved. All frames after 04:36:44 look blank.

REV 101:

Single pointing was used, at quiet sun on the disk. The exposure time was changed from 6 to 4, and then back to 6 just before sunset.

Target on sun: Granulation (quiet sun on disk)
WL camera on time: 217/05:17:56 (5 min after sunrise)
WL camera off time: 217/05:56:02
Elapsed time (sec): 2286
Repetition time: 2 sec
Total number of frames: 1144
Exposure factor: 6
Limb guider status: Off
Comments: Exposure factor changed to 4 at 05:56:04

Target on sun: Granulation (quiet sun on disk)
WL camera on time: 217/05:56:04
WL camera off time: 217/06:06:38
Elapsed time (sec): 634
Repetition time: 2 sec
Total number of frames: 318
Exposure factor: 4
Limb guider status: Off
Comments: Exposure factor changed back to 6 at
217/06:06:38

Target on sun: Granulation (quiet sun on disk)
WL camera on time: 217/06:06:40
WL camera off time: 217/06:06:50
Elapsed time (sec): 10
Repetition time: 2 sec
Total number of frames: 6
Exposure factor: 6
Limb guider status: Off
Comments: Exposure factor changed back to 6 at
217/06:06:38

REV 102:

For the first two minutes SOUP was pointed at the disk. SOUP was then moved to the limb, with the WL film field covering about $1/4$ of the sun and $4/5$ blank sky. About 3 min later the pointing was adjusted so that the WL film field included about $2/3$ sun and $1/3$ blank sky. Then it appears that the pointing was changed to the disk, the exposure factor was changed to 10, and the camera was left running until about 4 minutes after sunset.

Target on sun: Quiet sun (on disk)
WL camera on time: 217/06:48:07
WL camera off time: 217/06:50:07
Elapsed time (sec): 120
Repetition time: 2 sec
Total number of frames: 61
Exposure factor: 8
Limb guider status: Off
Comments: Some of these frames are blurry due to motions.

Target on sun: Solar limb
WL camera on time: 217/06:50:09
WL camera off time: 217/07:26:55
Elapsed time (sec): 2206
Repetition time: 2 sec
Total number of frames: 1104
Exposure factor: 8
Limb guider status: Off
Comments: Frames from 06:50:09 to 06:50:31 are blurry due to pointing move to limb. Pointing was $1/4$ sun, $4/5$ sky. Pointing was then adjusted from 06:52:41 to 06:53:17: result was $2/3$ sun and $1/3$ sky in field.

Target on sun: Solar disk (perhaps near AR 4682)?
WL camera on time: 217/07:27:15
WL camera off time: 217/07:41:29 (6 min after sunset)
Elapsed time (sec): 854
Repetition time: 2 sec
Total number of frames: 428
Exposure factor: 10
Limb guider status: Off
Comments: At exp=10 the film often advances twice. Much of this film is blurred. Sunset was at 07:38. From 07:37:25 to 07:38:27 the film annotation was unreadable due to blurring. The main spot of AR 4682 was visible then. Between 102 and 104 there are 3 blank frames.

REV 103:

No film exposures were taken on this rev. The guider was first turned on (it worked very well). Only CID filtergrams were taken (the CID data was not good).

REV 104:

SOUP pointed at quiet sun on the disk, well inside the limb. The guider was on and probably worked well. The autofocus program for the filtergraph was run and then manual focus was performed. Laser alignments were run and λ -scans were run in 6302 Å and 5576 Å. The autofocus program in H- α was not successful. Only 3 frames were taken in WL.

Target on sun:	Quiet sun (on disk)
WL camera frame 1:	217/10:08:10
WL camera frame 2:	217/10:11:36
WL camera frame 3:	217/10:17:33
Elapsed time (sec):	563
Repetition time:	none
Total number of frames:	3
Exposure factor:	4
Limb guider status:	On (probably working well)
Comments:	Images appear too faint on positive copy to be usable. Between 104 and 105 are about 20 blank frames.

REV 105:

SOUP was first pointed at the limb, then quiet sun on the disk. The guider was on but did not work well on the limb. The WL system was focused on the limb, then seq 114 (FO 1.4, short term evolution) was run on the disk with 14 WL frames taken.

Target on sun:	Quiet sun (on disk)
WL camera on time:	217/11:59:24
WL camera off time:	217/12:10:05
Elapsed time (sec):	641 sec
Repetition time:	47 sec, then 53 sec (alternates)
Total number of frames:	14
Exposure factor:	6
Limb guider status:	On (working well)
Comments:	Seq 114 running on filtergraph. Images appear too dark to be usable. Three blank frames occur between 105 and 106.

REV 106:

SOUP was pointed at quiet sun on the disk, not too close to the limb. The guider was on and probably OK. Seq 114 was run on the filtergraph for about 35 minutes, and 49 WL frames were recorded.

Target on sun: Quiet sun (on disk)
 WL camera on time: 217/13:05:04
 WL camera off time: 217/13:40:56
 Elapsed time (sec): 1552 sec
 Repetition time: 47 sec, then 53 sec (alternates)
 Total number of frames: 49
 Exposure factor: 6
 Limb guider status: On (probably working well)
 Comments: Seq 114 running on filtergraph. There are 4
 blank frames between 106 and 107.

REV 107:

SOUP was pointed at all 4 limbs in the following order: down, horizontal, right, and then vertical. The guider was off. Seq 116 (FO 4.5) was run in H- α on right limb. At the beginning there are 4 limb frames, then a large number of blank frames, then 13 frames containing density step wedges, and finally a regular sequence of images.

Target on sun: Quiet limb
 WL camera on time: 217/14:59:38
 WL camera off time: 217/15:11:33
 Elapsed time (sec): 715
 Repetition time: 13.5 sec
 Total number of frames: 53?
 Exposure factor: 8
 Limb guider status: Off
 Comments: This was preceeded by 4 limb frames (14:51:41,
 14:51:54, 14:52:07, 14:52:20), then about 60
 blank frames, then 49 overexposed frames, then
 13 frames with step wedges just before 14:59:38.
 Seq 116 running on filtergraph. Film density
 is decent. Three blank frames occur, 107 to 108.

REV 108:

SOUP was pointed at AR 4682, with the dominant spot centered in the VP field of view. The guider was on and looking great. WL film exposure was changed from 5 to 7 during the orbit.

Target on sun: AR 4682
 WL camera on time: 217/16:16:09
 WL camera off time: 217/16:30:27
 Elapsed time (sec): 858
 Repetition time: 2 sec
 Total number of frames: 430
 Exposure factor: 5
 Limb guider status: On (working very well)
 Comments: Change to Exp=7 at 16:30:25. On this copy the
 image looks too underexposed to be useful.

Target on sun: AR 4682
 WL camera on time: 217/16:33:18
 WL camera off time: 217/16:42:02
 Elapsed time (sec): 524
 Repetition time: 2 sec
 Total number of frames: 262
 Exposure factor: 7
 Limb guider status: On (working very well)
 Comments: Filtergraph was off. Five blank frames occur
 between 108 and 109.

REV 109:

SOUP was pointed at AR 4682, same as rev 108. guider was on and working very well. Filtergraph λ -scans were run on H- α , (came out fair), 6302 Å (came out good), and 5576 Å (scan was no good). The data consists of a sequence of 4 frames, then a 2 minute gap, then another sequence of 17 frames.

Target on sun: AR 4682
 WL camera on time: 217/18:03:08
 WL camera off time: 217/18:13:46
 Elapsed time (sec): 636
 Repetition time: 40 sec
 Total number of frames: 17
 Exposure factor: 7
 Limb guider status: On (working well)
 Comments: Filtergraph ran seq 25 until sunset. Four frames
 occur at the start (17:47:27, 17:48:58, 17:54:26,
 18:01:26), at strange time intervals. Fifteen
 blank frames occur between 109 and 110.

REV 110:

SOUP was pointed at AR 4682, with the VP field centered between the sunspot and the pores. The guider was on and working very well. The WL system was focused manually, than updated once from 19:38:07 to 19:40:40.

Target on sun: AR 4682
 WL camera on time: 217/19:10:35
 WL camera off time: 217/19:38:07
 Elapsed time (sec): 1652
 Repetition time: 2 sec
 Total number of frames: 827
 Exposure factor: 7
 Limb guider status: On (working well)
 Comments: Observations were interrupted at 19:38:07 until
 19:40:40 for focus adjustment.

Target on sun: AR 4682
 WL camera on time: 217/19:40:40
 WL camera off time: 217/19:43:30
 Elapsed time (sec): 150
 Repetition time: 2 sec
 Total number of frames: 72
 Exposure factor: 7
 Limb guider status: On (working well)
 Comments: Four frames lost (between 19:41:04 and 19:41:14)
 due to film splice. Both frames at 19:41:04 and
 19:41:14 show some damage. Slight change in back-
 ground occurs across the splice.

REV 111:

The white light film was used up part way into this orbit. An exposure test preceeds the data. It consists of 19 frames with the following exposure factors: 1, 2, 2, 3, 3, 4, 4, 5, 5, 6, 6, 8, 8, no annotation, 10, 10, 12, no annotation, and 12. SOUP was pointed at AR 4682, the same as rev 110. The guider was on and working very well.

Target on sun: AR 4682
 WL camera on time: 217/21:01:59
 WL camera off time: 217/21:08:24
 Elapsed time (sec): 444
 Repetition time: 2 sec
 Total number of frames: 223
 Exposure factor: 7
 Limb guider status: On (working well)
 Comments: The film ran out after 21:08:24, and there is
 no more WL film data after this time. The frame
 at 21:08:24 is damaged. The exposure test occurs
 before the data, between 20:50:45 and 20:56:06.

SOUP INFLIGHT ANOMALIES
T. D. Tarbell, O/9130, B/256 Last rev. 3-8-86

Three Major Problems: loss of science data resulted

Power Loss and Reappearance

Overheating of Focal Plane Package (FPP)

Severe Blemishes in Tunable Filter (TF) CID Camera Images

Power Loss and Reappearance

The Instrument Pointing System (IPS)-mounted package (telescope & FPP) lost all power after 4.5 hours of nominal on-orbit operation. Telemetry shows no anomalies before sudden, complete power loss. All power-on commands (several different procedures were tried) failed until day 6 of the mission. A nominal command then restored power and the power-on relay was "clamped" on for the next 36 hours. Power was lost again suddenly when the power-on relay was "unclamped" in preparation for landing. Further attempts to restore power on-orbit were unsuccessful. Power came on normally at KSC after landing.

Overheating of Focal Plane Package

FPP operated up to 42 °C during solar observing, 7 °C above the upper limit of the design range; some components ran at 10-12 °C above desired operating temperature. The electronics box on the cruciform ran up to 70 °C, which was the design upper limit.

Blemishes in TF CID Camera Images

Causes of CID imaging problems were:

- a) bubbles in TF oil
- b) contamination on TF CID
- c) contamination on FPP mirror
- d) central brightening in TF CID images
- e) vignetting along edges of TF CID
- f) diagonal line of dark pixels in TF CID
- g) increased noise in TF CID

DUMP OF TAPE JBOUT1

INFLU TAPE UECU1 CN +1
DATA INPUT H9 NF=2 SR=2+1=1

FILE		INPUT	DATA RECORDS	MAX. SIZE	PERM	ZERO	SUMMARY	UNDEF.	RECS.	TOTAL#
FILE		RECS.	INPUT	SIZE	PERM	ZERO	SUMMARY	UNDEF.	RECS.	TOTAL#
FILE		RECORD	1	LENGTH	2	BYTES				
(1)	FB3A6608	7E3B7208	CD1A487A	880A520B	5B0B8B0A	140AEAD9	470A5D0B	480C550C	F40B1A0B	780A170A
(4)	7E3B8008	63CA0F0B	0C0A3A1A	5A654B0A	CFC4410A	3C0A7C0A	2E0C440C	470C2A0C	5E0B1A0E	470E870B
(8)	7E3BEE04	D519FF08	0C199309	20C0310A	50C09505	34054705	480C320A	F0C4580A	A8053805	D8C80705
(12)	71CE8C08	26CAD109	1C0AC40B	790B6D0B	F40AEF09	3F09F208	C1080C08	EA08F408	C2086E08	0D08F907
(16)	42CEC308	FE6CE308	EC186208	340C6C08	C20E0408	C80E160E	CC07110E	1CC80F08	8C087505	9FCAD007
(20)	9E1A7A09	55086E07	D916A206	4405CC06	73079B08	5E077C07	500E010E	E11A8C05	CA08240E	EC07D007
(24)	71073707	93079F08	8619E809	8F09B908	F5087C09	52097208	D7070A08	0A08F907	E3078307	4307D007
(28)	87E14A05	81C87E07	3E071807	1C071D07	EC07F80E	0C07F90E	CE0E310E	3FC6F705	4A06F10E	AA075508
(32)	4A1E1E04	D8155A09	E719540A	6E1A7C0A	C50A520C	830CE00C	5E0CFF0C	450C390E	3E0F0C0E	140E5C0E
(36)	9A0DAF08	A71A8B0A	B51B410D	0DEAF00D	7D0D9F0D	8D0CBA0B	EC0A9C0A	440AE709	4E09C808	A1089408
(40)	AC1EE808	2E05640A	CF0B8E0C	1D0C540B	260B8A0B	4D0DF60D	710D360D	740CC30B	6A0B670A	3E09AF08
(44)	AC1EE808	4315230A	DE1A540E	5C1E520A	410E620A	F20E8707	EB0E3205	7F055F05	5E05A70E	D30E4E0E
(48)	A71E2107	9D071E08	EE177C07	3A070107	13077A07	E407E407	E407E407	E407E407	E407E407	7E0E720B
(52)	CD0A480A	880A520B	5B0B8B0A	140AEAD9	470A5D0B	480C550C	F40B1A0B	780A170A	7E098009	630AC0F0B
(56)	CD0E3A0A	98194B0A	CFC4410A	3C0A7C0A	2F0E040C	470C2A0C	5E0B1A0E	470E870B	4E0CFF08	DE0E0E08
(60)	CD195005	2D1A310A	5C091905	34054705	480C320A	F0C4580A	A8053805	D8C80705	9FCAD007	2E0CAD1C5
(64)	1C0A040B	790B6D0B	F40AEF09	3F09F208	C1080C08	CD07F108	1C080F08	8C087505	710E8C05	FE08DE08
(68)	E1CE6208	340E0C08	D208C408	C80E160E	CC07110E	1CC80F08	8C087505	9FCAD007	55086E07	9E075F08
(72)	D51A7A09	441E6C0E	73175B07	EE077C07	5E077C07	500E010E	E11A8C05	CA08240E	EC07D007	81087C07
(76)	8619E809	8F09B908	F5087C09	52097208	D7070A08	0A08F907	E3078307	4307D007	4E09C808	87081A05
(80)	3E071807	1D071C07	D507F806	1C071D07	EC07F80E	0C07F90E	CE0E310E	3FC6F705	4A06F10E	AA075508
(84)	B71CE40A	E51A7C0A	DE1A540E	6E1A7C0A	C50A520C	830CE00C	5E0CFF0C	450C390E	3E0F0C0E	140E5C0E
(88)	B50B8B0A	1D0EAF0D	7D0D9F0D	8D0CBA0B	EC0A9C0A	440AE709	4E09C808	A1089408	AC0E820E	2E05640A
(92)	CE0B880C	1D0C640B	260B8A0B	4D0DF60D	710D360D	740CC30B	6A0B670A	3E09AF08	AC0E8B08	4309230A
(96)	DE1E540E	3D0E3A0A	410E620A	E30E040C	470C2A0C	5E0B1A0E	470E870B	4E0CFF08	DE0E0E08	9E075F08
(100)	EE177C07	3A070107	13077A07	E407E407	E407E407	E407E407	E407E407	E407E407	E407E407	7E0E720B
(104)	5E1A8B0A	140AEAD9	470A5D0B	480C550C	F40B1A0B	780A170A	7E098009	630AC0F0B	98094B0A	2E0A310A
(108)	CE1A410A	3C0A7C0A	2F0E040C	470C2A0C	980B1E0B	470E870B	780B8E0A	D509FF08	0C095005	2E0A310A
(112)	51CE1905	34054705	480C320A	F0C4580A	A8053805	D8C80705	9FCAD007	1C0A0C0E	7E0E8C0E	340E6C0B
(116)	F40AEF09	3F09F208	C1080C08	CD07F108	1C080F08	8C087505	9FCAD007	55086E07	9E075F08	340E6C0B
(120)	D208C408	C80E160E	CC07110E	1CC80F08	8C087505	9FCAD007	55086E07	9E075F08	340E6C0B	340E6C0B
(124)	7E175B07	5E077C07	500E010E	E11A8C05	CA08240E	EC07D007	4307D007	4E09C808	87081A05	81087C07
(128)	F507E805	52157208	CF171A0E	CA0EF907	E307E307	4207D007	710E8105	810E8707	3F071E07	1C071D07
(132)	CE07F805	0C07F90E	DE069006	3E06F705	4A06F10E	AA075508	D8095A09	B7095A09	B7095A09	87095A09
(136)	DE1A520C	830CE00C	5E0CFF0C	450C390E	3E0F0C0E	140E5C0E	9A0DAF08	A70AB80A	B50B410D	0C0EAF0D
(140)	7D1CE50E	8D0CBA0B	EC0A9C0A	440AE709	4E09C808	A1089408	AC0E820E	2E05640A	AC0E8B08	4309230A
(144)	2E1A8B0A	4D0DF60D	710D360D	740CC30B	6A0B670A	3E09AF08	AC0E8B08	4309230A	DE0A540E	50E83A0B
(148)	410E620A	F30B8707	BB16E205	7F056F05	9805A705	D3054F0E	AT062107	9D071E08	EE077C07	3A070107
(152)	13077A07	E407E407	F407E407	7E0E720B	7E0E720B	7E0E720B	7E0E720B	7E0E720B	7E0E720B	7E0E720B
(156)	470A5D0B	480C550C	F40B1A0B	780A170A	7E098009	630AC0F0B	98094B0A	2E0A310A	3C0A7C0A	3C0A7C0A
(160)	2F0E040C	470C2A0C	980B1E0B	470E870B	780B8E0A	D509FF08	0C095005	2E0A310A	90094B0A	3409230A
(164)	480C550C	F40B1A0B	780A170A	7E098009	630AC0F0B	98094B0A	2E0A310A	3C0A7C0A	3C0A7C0A	3C0A7C0A
(168)	C11E6208	EAC1E408	C2186E08	CC07110E	1CC80F08	8C087505	9FCAD007	55086E07	9E075F08	340E6C0B
(172)	CD07F108	1C080F08	8C087505	9FCAD007	55086E07	9E075F08	340E6C0B	340E6C0B	340E6C0B	340E6C0B
(176)	5C0BDF09	B10A8B09	CA08240E	EC07D007	71070707	93079F08	8609E809	8F09B908	F5087C09	52097208
(180)	DE17CA08	JA0E9007	E307E307	4217D007	870E1A05	810E8707	3F071E07	1C071D07	0E07FE0E	0C07FE0E
(184)	DE0E0E08	3F06FF05	4A06F10E	AA075508	D8095A09	B7095A09	B7095A09	B7095A09	B7095A09	B7095A09
(188)	DE0E0E08	3F06FF05	4A06F10E	AA075508	D8095A09	B7095A09	B7095A09	B7095A09	B7095A09	B7095A09
(192)	DE0E0E08	3F06FF05	4A06F10E	AA075508	D8095A09	B7095A09	B7095A09	B7095A09	B7095A09	B7095A09
(196)	710D360D	740CC30B	6A0B670A	3E09AF08	AC0E8B08	4309230A	DE0A540E	50E83A0B	410B620A	F30B8707
(200)	BE0E3205	7F056F05	9805A705	D3054F0E	AT062107	9D071E08	EE077C07	3A070107	13077A07	E407E407
(204)	E41E4A07	E41E4A07								

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FILE	INPUT	DATA RECORDS	MAX. SIZE	READ ERROR SUMMARY	INPUT RETRIES					
	RECS.	INPUT	SIZE	PERM ZERO B SHORT UNDEF.	#RECS. TOTAL#					
1	2	3	4	5	6					
FILE	RECORD	LENGTH	BYTES							
(1)	9098E D	280C8D7C	40 CF9 B	290987C	8300C23B	2910200C	DB0C622D	780C630B	A60E970C	700DF80C
(4)	EE308D9C	580C690C	FA0CAAJC	176D130D	CB0DD8D	920D120E	B30DC80C	330D7F0D	A80D960E	800DF90D
(5)	6F1E97C	2ACD650D	C72DC7C	20CE630E	42CE150E	470E437E	EE0E100F	CAC0E34E	AC0E740E	22CECF0E
(120)	650E073E	A70E960E	E72D600E	D10F310E	E90D640D	0C0EAB0D	F80DE20D	FC0D250E	930DD60D	50CE810F
(16)	ABE237F	570E400F	D10E0E0E	FA0E200E	150ED80E	4E0E800E	E30E310F	C60E0E0E	1410081F	8AC0E60E
(21)	20CE0C0C	D20CF80C	5C0E7B0C	F80D020D	E60CE60C	9C0C130C	CAC0C00C	1C0C0C0C	B50C830B	5C0C830B
(24)	5C0C7F0C	5C0C7A0C	5A0C330D	5D0D250D	CF0C0E0C	9F0DF40E	140D0C0D	E40C7E0C	050D9E0C	E10C660C
(28)	7E0C0C0C	BE0C070C	5E0CF40B	670E830B	80E9310B	080EFA0B	CF0E800C	8B0B390C	E20B160C	200C030B
(32)	2A0E030A	7A0A130B	A50A860A	620A020A	CAC0A00A	64044F0B	700E830B	C70A860A	CF0A270A	310CAE0A
(35)	6F0AFA09	230A870A	890AEF0B	CA0BED0B	670C9C0B	E00A9E0A	830A910A	BC0A0A0A	830A0A0A	0A0BEA0A
(40)	4C0E400B	FF0CAD00A	820AB40B	620C0A0C	7B0C9F0C	040C600C	D60CA50C	000C880B	C50B850B	5E0B6D0B
(44)	4E0E0C0E	5E0E680A	E30A060A	7A0B050A	100A330B	120A060A	7B0A710A	400A330A	400A330A	400A330A
(48)	200CA30A	A40A000B	030A330A	1B0A1F0A	500E8C0B	8C078B0A	8D0A0E0A	8C0A0E0A	8C0A0E0A	8C0A0E0A
(52)	400CF90B	290C980C	830C020B	CB0C020D	DB0C020D	7B0C030B	A60B970C	700DF80C	700DF80C	700DF80C
(56)	FACCA00C	170C130C	CB0C020B	520C120C	E30C0C0C	320C7F0C	A809600D	100D950D	6F0D950D	2A0D950D
(60)	C70E0C0E	200E330E	420E150E	470E437E	E30E310F	CA0E340E	AD0E740E	220E0F0E	A70E560E	E70E0E0E
(64)	E70E060E	D10F310E	E90D440D	040E850F	FB0DE20D	FC0D250E	930DD60D	50CE810F	AB0E200F	970E400F
(68)	D10E050E	DA0E220E	190E080E	4E0E800E	530E310F	0A0E340E	1410081F	8A0E6F0E	8A0E6F0E	8A0E6F0E
(72)	50E07B0C	B80D020D	BE0D660C	9C0C130C	8C0CF30C	0A0C0C0C	0C0CF30C	850C0C0C	850C0C0C	850C0C0C
(76)	5A0C330D	5D0D250D	CF0CED0C	9F0D0A0E	140D060D	540C7E0C	050D9E0C	E10C660C	E10C660C	E10C660C
(80)	5E0CF40B	570B830B	80CB930B	80B8E40B	DF0B8C0C	880B830C	E20B060C	200C030B	200C030B	200C030B
(84)	5E0A0E0A	620A020A	CA0A060A	E40A4E0B	700E830B	D70A890A	CF0A270A	310CAE0A	4E0A0E0A	4E0A0E0A
(88)	B90AEF0B	CAB0E00B	070C9C0B	E00A9E0A	830A910A	EC07A00A	E50A0C0A	CAC0E34E	AC0E740E	AC0E740E
(92)	820B860B	7A0B050A	010A330B	120A060A	7E0A710A	4E0A060A	530A0E0A	FF0A050B	200CA30A	4A0A000B
(96)	E30A060A	7A0B050A	010A330B	120A060A	7E0A710A	4E0A060A	530A0E0A	FF0A050B	200CA30A	4A0A000B
(100)	830C020B	920D120E	CB0C020B	DB0C020D	7B0C030B	A60B970C	700DF80C	EE0C8D0C	580C690C	FACCA00C
(104)	830C020B	920D120E	CB0C020B	DB0C020D	7B0C030B	A60B970C	700DF80C	EE0C8D0C	580C690C	FACCA00C
(108)	420E150E	470E437E	EE0E310F	CA0E340E	AD0E740E	220E0F0E	650E070E	A70E560E	E70E0E0E	D10F310E
(116)	E90DD40D	0CCEA50D	FB0DE20D	FC0D250E	930DD60D	50CE810F	AB0E200F	970E400F	D10E050E	DA0E220E
(120)	150E0B0E	4E0E850F	E30E310F	CA0E340E	AD0E740E	220E0F0E	650E070E	A70E560E	E70E0E0E	D10F310E
(124)	B60D660C	9C0C130D	8C0DF30C	A0C0C30B	3C0C0D0C	E10C660C	7E0C0C0B	8E0C070C	590CF40B	670B830B
(128)	CF0CED0C	9F0D0F40E	140D060D	540C7E0C	050D9E0C	E10C660C	7E0C0C0B	8E0C070C	590CF40B	670B830B
(132)	E00E930B	80E8E40B	DF0B8C0C	E20B060C	200C030B	2A0B030A	7A0A130B	A50A0E0A	620A020A	620A020A
(136)	CA0A060A	640A020A	7C0BA30B	CF0A270A	310CAE0A	4E0A0E0A	4E0A0E0A	230A870A	820B860B	620B860B
(140)	070C9C0B	E00A9E0A	830A910A	EC0A0A0A	830A0A0A	0A0BEA0A	5E0B6D0B	580B0C0B	980A060A	E30A060A
(144)	7E0C9F0C	040C600C	D60CA50C	E10C660C	7E0C0C0B	8E0C070C	590CF40B	670B830B	620A020A	620A020A
(148)	D10A330B	120A060A	7E0A710A	4E0A060A	530A0E0A	FF0A050B	200CA30A	4A0A000B	4A0A000B	4A0A000B
(152)	300B8C0B	8D0A0E0A	8D0A0E0A	8C0A0E0A	8C0A0E0A	8C0A0E0A	8C0A0E0A	8C0A0E0A	8C0A0E0A	8C0A0E0A
(156)	310C630C	E40C7E0C	5A0C330C	AT0C170D	160DE00C	D30C230D	3C0D0C0C	CA0C8C0C	0C0D5A0E	550D880D
(160)	240C0E0E	F50C7E0C	0C0DE60C	C70E540D	3A0E320E	800D950C	900D700C	430E0A0E	C50D070C	AAC0E00E
(164)	A30E630F	E40E720E	A10D040C	E40E590E	2C0E050F	460E300F	450E0F0E	D10E750F	B30E6B0E	430E450E
(168)	090E010E	ED0C070E	FF0D0D0D	2C0E350F	460E300F	450E0F0E	D10E750F	B30E6B0E	430E450E	430E450E
(172)	E10E0A0F	CB0E0C0E	5B104F1C	E40E8F0E	FE0C030C	5E0E0C0C	F00E0C0C	FL0C0A0D	200E4B0D	CD0C2B0D
(176)	F00E0A0C	290CEB0B	FE0E0A0E	7E0E850B	340C100C	B00C400C	A20D9E0D	500DE00C	7F0C940E	3F0C940E
(180)	FF0B660C	900C6A0C	010CEA0B	FF0C0C0C	9C0E8B0B	5F0D490C	440C150C	AF0B8B0B	940BAE0B	940BAE0B
(184)	520E2B0C	100C730C	350CAB0E	E70E610B	C10E100B	140E150E	1E0E3E0B	C50A9E0A	480A260A	750A260A
(188)	2E0E440B	A01A7C0A	600A090A	DE0E630A	210A2A0A	810A5F0A	C00A0A0B	450E5F0B	FE0E8E0E	FE0E8E0E
(192)	FE0A020A	910A0A0A	720A050A	310E3C0B	C00EAD0A	7F0E0E0E	C50B1F0C	E90B0C0E	FE0E8E0E	FE0E8E0E
(196)	580C690C	D90C640C	DE0B870A	CAT0A80A	2E0E4E0B	FE0A410A	BAC0A00A	8F0A030A	4C0A520A	530A0A0A
(200)	4C0A0A0A	AE0A0E0B	550A590A	C40A0D0B	5B0B760B	C00A010B	9E0A880A	E509380A	460A860A	4D0A4D0A